

DETAILED ACTION

Response to Arguments

Applicant's arguments, see paragraph bridging pages 5 and 6, filed March 5, 2010, with respect to the rejection of claims 3-5 and 7-12 under 35 USC 103(a) have been fully considered and are persuasive. Therefore, the rejection and the finality of the previous Office action have been withdrawn. However, upon further consideration, a new ground of rejection is set forth below.

Claim Objections

Claims 9 and 12 are objected to because of the following informalities: The amendment intended to change the dependency of claims 9 and 12 from claim 4 to claim 3 did not actually include the deletion of 4 (i.e., [[4]]). Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation

under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 3, 5, 7-10 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 2003-100701 (Masafumi et al., hereinafter, Masafumi) in view of JP 2002-203823 (Takahashi et al. , hereinafter, Takahashi) and further in view of US Patent 6,234,873 issued to Yamamoto et al. (hereinafter, Yamamoto).

Masafumi teaches a method for processing of a silicon wafer, comprising: subjecting a cleaned, lapped silicon wafer having degraded superficial layers to an etching process with an aqueous acid etching solution and an alkali etching solution to obtain an etched wafer. Masafumi teaches providing a mirror-polish to the front surface of the etched wafer and cleaning the front surface mirror-polished wafer. Masafumi teaches the alkali etching is performed after the acid etching (see, for example, abstract). Masafumi teaches the alkali etching is performed by immersing the silicon wafer into the alkali etching solution. Masafumi teaches the aqueous acid etching solution is composed of hydrofluoric acid and nitric acid, and may contain phosphoric acid (see, for example, [0013] and claims 4 and 5). Masafumi teaches providing the front surface with a mirror-polish and the rear surface with a slight-polish (see for example, claim 7 and [0008]).

Regarding claim 7, Masafumi teaches the acid and the alkali etching solutions are stored in separate etching tanks (see for example, abstract).

Regarding claim 8, Masafumi teaches a cleaning process is performed between the acid etching process and the alkali etching process (see, for example, [0018]).

Regarding claims 3 and 5, Masafumi does not teach the acid etching solution comprises 30 -40 % phosphoric acid by weight. Masafumi does not teach the acid etching is performed by a spin-coating method, in which the acid etching solution is dripped on the silicon wafer, and said wafer is spun so that said dripped acid etching solution is expanded on the whole wafer surface.

Takahasi teaches an acid etching process wherein the acid comprises 30 -40 % phosphoric acid by weight.

Yamamoto teaches a process also directed to providing a mirror polish to a wafer's front surface and a slight polish to the rear surface. Yamamoto teaches using a spin-coating method to conduct the acid etching.

It would have been obvious to one skilled in the art to incorporate the 30-40% by weight phosphoric acid of Takashi into the method of Masafumi because Takashi (especially, in paragraphs [0014] - [0069]) discloses an invention characterized in that the acid etching solution, like that of Masafumi's, is mainly composed of hydrofluoric acid and nitric acid but Takashi teaches adding phosphoric acid in an amount of between 10 to 40 percent by weight in order to reduce the unevenness of the front surface of the wafer. As this is the same objective of Masafumi, it would have been obvious to use the 30% - 40% by weight of phosphoric acid as taught by Takashi.

Furthermore, it would have been obvious to one skilled in the art to incorporate the spin-coating method of Yamamoto into the process of Masafumi because Yamamoto teaches that "compared with other etching processes, the etching rate of the spin-etching process employing acid etching liquid is easier to be controlled.

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Therefore, the glossiness of the rear surface can be arbitrarily selected" (column 4, lines 58-61).

Regarding claim 3, Masafumi does not teach performing the rear surface slight-polishing step before the front surface mirror-polishing step.

It would have been obvious to one skilled in the art to carry out the mirror-polishing step last so that the mirror polished surface would not be unnecessarily scratched in subsequent processing steps.

Regarding claims 9 and 10, Masafumi does not teach that a cleaning process is performed between each independent step.

It would have been obvious to one skilled in the art to conduct a cleaning process between each independent step so as not to cross contaminate the materials used in each process step.

Regarding claims and 12, Masafumi does not teach that the rear surface slight-polishing removes less than about 0.3 μm from the rear surface.

It would have been obvious to one skilled in the art to minimize the amount of material removed from rear surface during the slight polishing process in order to maintain the visible distinction between the slight-polished side and the mirror polished side while at the same time preserving as much of the wafer thickness as possible.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allan Olsen whose telephone number is 571-272-1441. The examiner can normally be reached on M, W and F: 1-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Allan Olsen/
Primary Examiner, Art Unit 1792